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Indian Standard

SPECIFICATION FOR PORCELAIN INSULATORS FOR TELEGRAPH AND TELEPHONE LINES

(*Third Revision*)

Third Reprint NOVEMBER 1996

UDC 621.315.62 : 621.315.612.2 : 621.39

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Gr 5

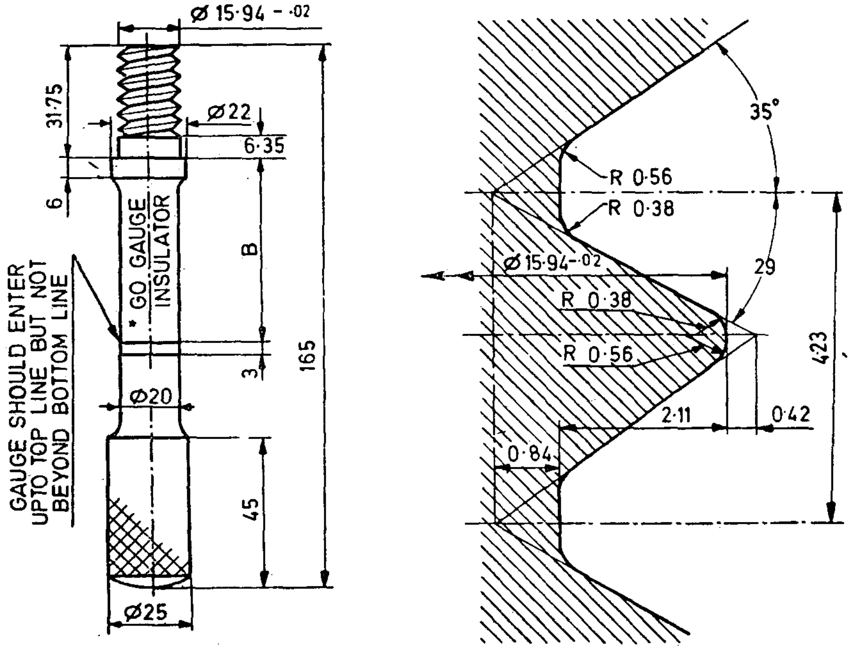
June 1976

AMENDMENT NO. 1 OCTOBER 1983
TO
IS : 283 - 1976 SPECIFICATION FOR PORCELAIN INSULATORS FOR TELEGRAPH AND TELEPHONE LINES

(Third Revision)

Corrigendum

(*Page* 11, *Fig.* 5) — Substitute the following for the existing figure:



	B
Large, double-shed	58·74
Small, double-shed	41·28
Pot-head, double-shed	50·00

*To be engraved on body as indicated.

All dimensions in millimetres.

FIG. 5 ‘ GO’ GAUGE

(ETDC 3)

Printed at Printograph, New Delhi, Ph : 5726847

AMENDMENT NO. 2 MARCH 1989

TO

IS : 283 - 1976 SPECIFICATION FOR PORCELAIN INSULATORS FOR TELEGRAPH AND TELEPHONE LINES

(Third Revision)

(*Page* 9, *clause* **6.1**) — Substitute the following for the existing clause:

All insulators shall be packed in layers in a wooden box with card board separators fitted with suitable cushion/grass packing on all inside walls of the box and also between layers if packing consists of more than one layer for the same box.'

(*Pages* 9 *and* 10, *clauses* **7.1.2** *to* **7.1.2.4**) — Substitute the following for the existing clauses:

"**7.1.2** *Acceptance Tests* — The following shall constitute the acceptance tests:

a) Verification of dimensions (**7.2**),

b) Temperature cycle tests (**7.3**),

c) Insulation resistance test (**7.4**),

d) Mechanical test (**7.5**); and

e) Porosity test (**7.6**).

7.1.2.1 Unless otherwise agreed, recommended sampling plan given in Appendix A shall be followed.

NOTE — The sampling plan has been prepared on the basis of IS : 2500 (Part 1)-1973 'Inspection by attributes and by count of defects *(first revision)*', shall provide uniform protection to the supplier of insulators either in small lots or bigger lots. This has been necessitated due to the fact that the earlier criteria of acceptance of lots gave less protection to the supplier of smaller lots than the supplier of bigger lots."

(*Page* 17 — Insert the following appendix at the end of the text:

'APPENDIX A

(*Clause* 7.1.2.1)

SAMPLING PROCEDURE FOR PORCELAIN INSULATORS FOR TELEGRAPH AND TELEPHONE LINES

A-1. SCALE OF SAMPLING

A-1.1 Lot — In a consignment, all the insulators of the same type and design manufactured from the same material in the same factory under similar conditions of production shall be grouped together to constitute a lot.

A-1.2 The number of insulators to be selected from each lot shall depend upon the size of the lot and shall be in accordance with col 1 and 2 of Table 4.

A-1.2.1 These insulators shall be selected from the lot at random. In order to ensure the randomness of selection, procedure given in IS : 4905-1968*, may be followed.

TABLE 4 SAMPLE SIZE AND ACCEPTANCE NUMBER

(*Clauses* A-1.2, A-2.1, A-2.2 *and* A-2.3)

Lot Size	For Dimensions, Temperature Cycle and Insulation Resistance Test					For Mechanical Test and Porosity Test	
	First Sample Size	Second Sample Size	Acceptance Number	First Rejection (r_1)	Second Rejection (r_2)	First Sample Size	Second Sample Size
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Up to 1 000	8	8	0	2	2	5	5
1 001 to 3 000	13	13	0	2	2	8	8
3 001 to 10 000	20	20	0	2	2	13	13

A-2. NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

A-2.1 All the insulators selected at random according to col 1 and 2 of Table 4 shall be subjected to dimensions, temperature cycle and insulation resistance tests. The insulators failing to satisfy either of the requirements shall be termed as defectives. The lot shall be considered as conforming to these requirements if the number of defectives found in the sample is less than or equal to corresponding acceptance number given in col 4 of Table 4. The lot shall be rejected if the number of defectives in the same is greater than or equal to the first rejection number (r_1) given in col 5. If the number of defectives is between the acceptance number and the first rejection number, a second sample of the same size (*see* col 3 of Table 4) shall be selected from the lot at random and subjected to these tests. The number of defectives in the first sample and second sample shall be combined. If the combined number of defectives is less than the second rejection number (r_2) given in col 6 of Table 4, the lot shall be considered as conforming to these requirements. Otherwise the lot shall be rejected without further testing.

A-2.2 The lot which has been found as conforming to the above requirements shall then be divided into two parts, as shown in col 7 and 8 of Table 4. The number of insulators to be tested for mechanical and porosity tests shall be in accordance with col 7 of Table 4. The lot shall be considered as conforming to these requirements if no defective is found in the sample and shall be rejected if there are two or more defectives. If there is one defective, a second sample of same size (*see* col 8 of Table 4) shall be selected at random and subjected to the tests. The lot shall be considered as conforming to these requirements if no defective is found in the second sample; otherwise the lot shall be rejected without further testing.

A-2.3 The lot shall be considered as conforming to the requirements of acceptance tests if conditions in **A-2.1**, and **A-2.2** are satisfied.

---

*Methods for random sampling.

(ETDC 3)

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AMENDMENT NO. 3 OCTOBER 1991
TO
IS 283 : 1976 SPECIFICATION FOR PORCELAIN INSULATORS FOR TELEGRAPH AND TELEPHONE LINES

(Third Revision)

(*Page* 14, *clause* **7.3.2**, *first sentence*) — Substitute the following for the existing first sentence:
'The complete test shall comprise five transfers; namely, hot to cold, cold to hot, hot to cold, cold to hot, and hot to cold.'

(*Page* 16, *clause* **7.4.1**, *last line and clause* **7.4.2.1**, *second line*) — Substitute 'megaohms' *for* 'megohms' and 'megohm' respectively.

(ETDC 6)

AMENDMENT NO. 4 SEPTEMBER 2003
TO
IS 283 : 1976 SPECIFICATION FOR PORCELAIN INSULATORS FOR TELEGRAPH AND TELEPHONE LINES

(Third Revision)

(*Page* 10, *clause* **7.2.1.1**, *line* 2) — Substitute 'Table 1' *for* ' Table 2'.

(*Page* 16, *Table* 2, *Heading*) — Substitute '**Table 1**' *for* '**Table 2**'.

(*Page* 17, *clause* **7.5**, *line* 7) — Substitute 'Table 2' *for* ' Table 3'.

(*Page* 17, *Table* 3, *Heading*) — Substitute '**Table 2**' *for* '**Table 3**'.

[*Amendment No.* 2, *Table* 4] —Substitute ' **Table 3**' *for* ' **Table 4**'.

[*Amendment No.* 2, *clauses* **A-1.2**, **A-2.1** *and* **A-2.2**] — Substitute 'Table 3' *for* 'Table 4' wherever it appears.

(ETD 06)

Reprography Unit, BIS, New Delhi, India

Indian Standard

SPECIFICATION FOR PORCELAIN INSULATORS FOR TELEGRAPH AND TELEPHONE LINES

(Third Revision)

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(*Continued on page* 2)

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Indian Standard

SPECIFICATION FOR PORCELAIN INSULATORS FOR TELEGRAPH AND TELEPHONE LINES

(Third Revision)

0. FOREWORD

0.1 This Indian Standard (Third Revision) was adopted by the Indian Standards Institution on 2 April 1976, after the draft finalized by the Electrical Insulators and Accessories Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard, originally published in 1951, was first revised in 1959, when the single-shed pot-head insulators and oil-cup insulators were excluded from its scope since the Posts and Telegraphs Department of the Government of India had decided to discontinue their use. Provision was also made for the inclusion of double-shed pot-head insulators which were found to be satisfactory.

0.2.1 The second revision was issued in 1966 with a view to aligning this standard with other electrical insulator standards and effecting complete metricization. In that revision, which included all the amendments issued to-date to the first revision, a statistical sampling plan for the selection of insulators for acceptance tests had also been incorporated.

0.3 The third revision has been undertaken with a view to simplifying the manufacture of large and small double-shed insulators by modifying the shape of the top of these type of insulators.

0.4 This standard has been prepared primarily to meet the requirements of the Indian Posts and Telegraphs Department. The insulators covered by this standard should also be suitable for telegraph and telephone lines of the Railways and other users. The standard does not, however, cover the insulators required for the communication circuits run solely for the operation and maintenance of electric transmission systems and in close proximity to such lines.

0.5 The stalks for use with these insulators are covered by IS:1441-1966*.

---

*Specification for insulator stalks for telegraphs and telephone lines (*first revision*).

0.6 In the preparation of this standard, assistance has been derived from BS 16:1949 'Telegraph material insulators, pole fittings, etc' issued by British Standards Institution.

0.7 This standard is one of a series of Indian Standard specification on porcelain electrical insulators.

0.8 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers the pin type porcelain insulators intended for use in supporting telegraph and telephone lines.

1.1.1 This standard does not cover insulators for communication lines running in close proximity to power transmission lines.

2. TERMINOLOGY

2.0 For the purpose of this standard. the following definitions shall apply.

2.1 Pin Insulator — A rigid insulator consisting of single piece of porcelain or of two or more porcelain components permanently connected together, and intended to be mounted rigidly on a supporting structure by an insulator pin passing up inside the insulator. Unless otherwise stated, this term excludes the insulator pin.

2.2 Lot of Insulator — All the insulators of the same type and design manufactured under similar conditions of production, offered for acceptance; a lot may consist of the whole or part of the quantity ordered.

2.3 Type Tests — Tests carried out to prove conformity with the specification. These are intended to prove the general qualities and design of a given type of insulator.

2.4 Acceptance Tests — Tests carried out on samples taken from a lot for the purpose of acceptance of the lot.

2.5 Routine Tests — Tests carried out on each insulator to check requirements which are likely to vary during production.

Rules for rounding off numerical values (*revised*).

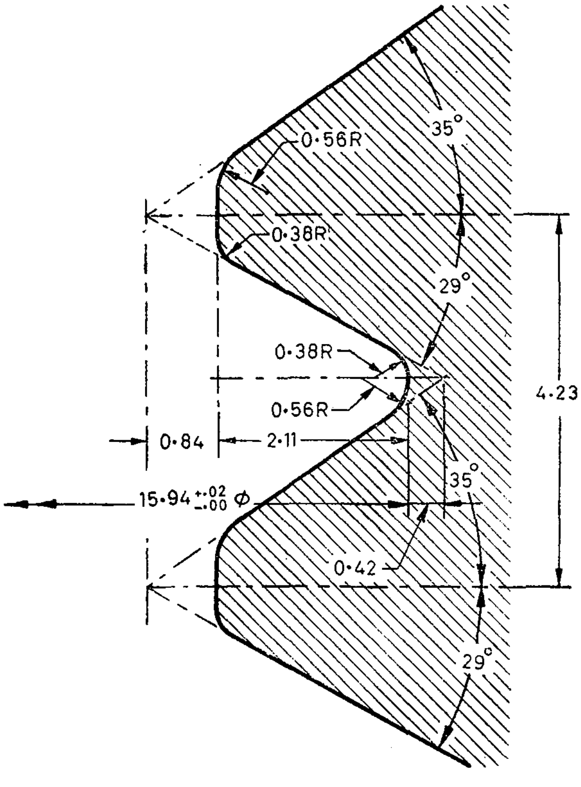
3. GENERAL REQUIREMENTS

3.1 Material — The porcelain shall be sound, free from defects (such as cracks, chips, dots, specks, and other imperfections), thoroughly vitrified and smoothly glazed.

3.2 The glaze shall cover all the porcelain parts of the insulator except those areas which serve as supports during firing or are left unglazed for the purpose of assembly.

3.3 Colour — Unless specified otherwise by the purchaser, the glaze shall be white in colour.

3.4 Threading — The threads on the insulator shall conform to the profile shown in Fig. 1.



All dimensions in millimetres.

FIG. 1 PROFILE OF INSULATOR THREADS

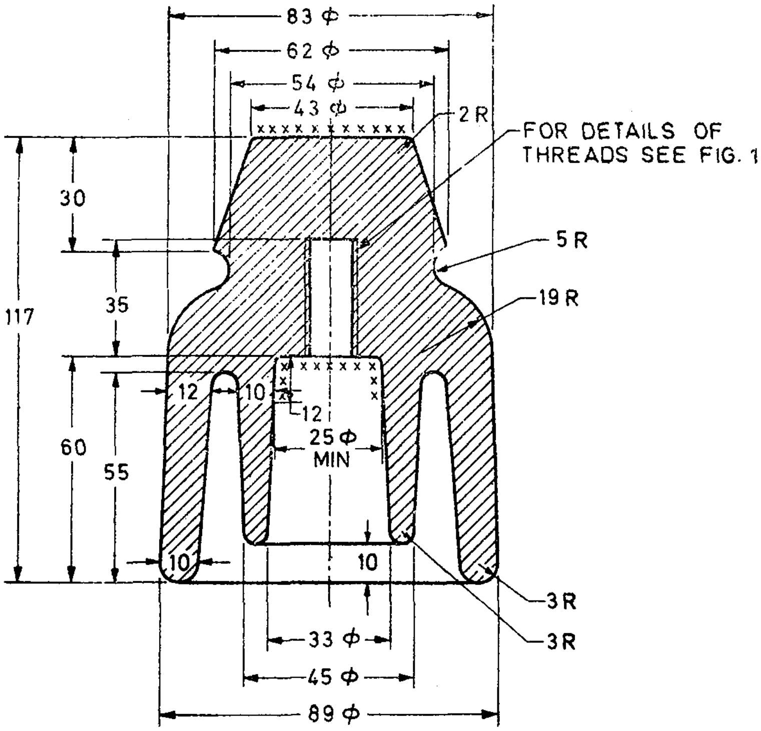
3.4.1 In the case of pot-head insulators, no sealing compound shall be applied, but the threaded portion of the cap and the corresponding threads on the insulator shall be lightly brushed with pure paraffin wax so as to enable the cap to be easily screwed on and off without damage to the threads.

4. DIMENSIONS

4.1 The shapes and dimensions of insulators shall be in accordance with the figures referred to against each:

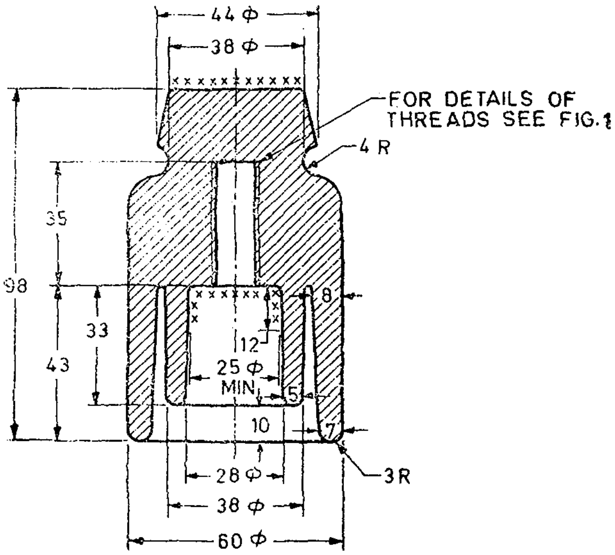
Type	*Fig. No.*
Large, double-shed	2
Small, double-shed	3
Pot-head, double-shed	4

NOTE — Wherever dimensions are not given, the shape of the insulator shall conform to the one indicated in the relevant drawing.



XXX Unglazed.
All corners to be rounded.
All dimensions in millimetres.

FIG. 2 INSULATOR, LARGE, DOUBLE-SHED



XXX Unglazed.
All corners to be rounded.
All dimensions in millimetres.

Fig. 3 Insulator, Small, Double-Shed

5. MARKING

5.1 Each insulator shall be legibly and indelibly marked to show the following:

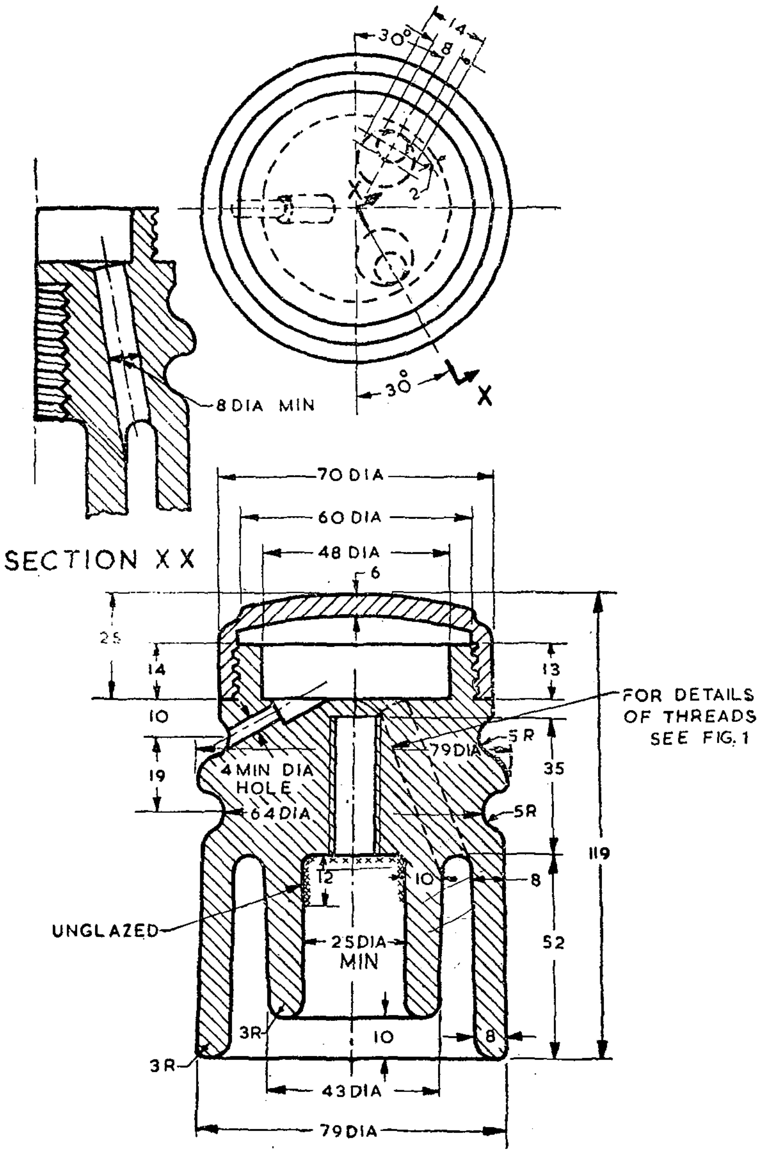
a) Name or trade-mark of the manufacturer,
b) Month and year of manufacture,
c) Country of manufacture, and
d) Minimum failing load in newtons.

5.1.1 Markings on porcelain shall be printed and shall be applied before firing.

5.2 BIS Certification Marking

The product may also be marked with Standard Mark.

5.2.1 The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made hereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.



XXX Unglazed.

All corners to be rounded.

All dimensions in millimetres.

FIG. 4 INSULATOR, POT-HEAD, DOUBLE-SHED

6. PACKING

6.1 All insulators shall be packed in crates or boxes suitable for rough handling.

7. TESTS

7.1 General

7.1.1 *Type Tests* — The following shall constitute the type tests:

a) Verification of dimensions (**7.2**),
b) Temperature cycle test (**7.3**),
c) Insulation resistance test (**7.4**),
d) Mechanical test (**7.5**),
e) Porosity test (**7.6**), and
f) Visual examination (**7.7**).

7.1.2 *Acceptance Tests* — The number of insulators to be selected at random from the lot for these tests shall be in accordance with Table 1. If required (*see* **7.1.2.2**) additional insulators shall also be selected at random.

TABLE 1 NUMBER OF INSULATORS TO BE SELECTED

LOT SIZE (1)	SAMPLE SIZE OF INSULATORS (2)
Up to 500	To be agreed between the purchaser and the supplier
501 to 800	24
801 ,, 3 200	32
3 201 ,, 8 000	36
8 001 and above	40

7.1.2.1 The acceptance tests shall be as follows:

a) Verification of dimensions (**7.2**),
b) Temperature cycle test (**7.3**),
c) Insulation resistance test (**7.4**),
d) Mechanical test (**7.5**), and
e) Porosity test (**7.6**).

The insulators selected in accordance with **7.1.2** shall be divided into two equal groups and subjected to tests as indicated below:

Test (*see* **7.1.2.1**)	*Group of Sample*
7.2, **7.3** and **7.4**	First group
7.5 and **7.6**	Second group

7.1.2.2 If only one insulator fails to comply with any one of the tests given in **7.2** to **7.6** a fresh quantity equal to twice the first quantity shall be subjected to retesting. The retesting shall comprise the test in which the failure occurred preceded by those tests which may be considered to have influenced the results of the original tests. If no failure occurs, the lot shall be accepted.

7.1.2.3 If two or more insulators fail to comply with any of the tests given in **7.2** to **7.6** or if any failure occurs on insulators subjected to retesting described in **7.1.2.2**, the complete lot shall be withdrawn for further examination by the manufacturer after which the lot or any part thereof may be resubmitted for tests. The number then selected shall be three times the first quantity chosen for tests. This retesting shall comprise the test in which the failure occurred preceded by those tests which may be considered to have influenced the results of the original tests. If any failure occurs, the lot shall be rejected.

7.1.2.4 No part of the lot withdrawn as described in **7.1.2.3** shall constitute part of any other lot submitted for the first time.

7.1.3 The following shall be carried out as routine tests:

a) Routine verification of dimensions (**7.2.2**),

b) Routine insulation resistance test (**7.4.2**), and

c) Visual examination (**7.7**).

7.2 Verification of Dimensions

7.2.1 The gauges shall be of hardened tool steel and shall be in accordance with Fig. 5 to 9. They shall be finished bright and all surfaces shall be protected from oxidation by treatment with neutral petroleum jelly

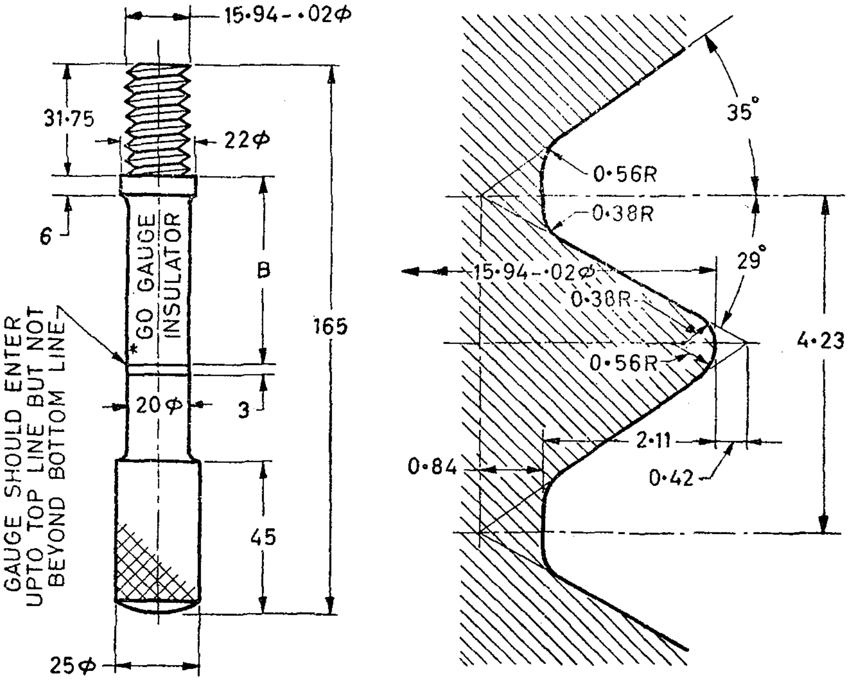
7.2.1.1 The insulators shall pass the gauge test as described in Table 2.

7.2.1.2 For dimensions not covered by the gauges a tolerance of ± 5 percent shall be allowed. However, the negative tolerance shall not be permitted for the thickness of the outer shed. The thickness shown in the figures shall be taken as the minimum permitted. In the case of unimportant dimensions for radii, the tolerances are given for guidance only and may not be rigidly followed.

7.2.2 *Routine Verification of Dimensions* — In the case of routine verification of dimensions, the insulators shall be tested with the 'GO' screw gauge (*see* Fig. 5).

7.3 Temperature Cycle Test

7.3.1 The insulators shall be quickly and completely immersed in a water-bath maintained at a temperature of 70°C above that of the cold water and left submerged for a period of 15 minutes. They shall then be withdrawn and quickly and completely immersed, without being placed in an intermediate container, in a bath of cold water for the same period of 15 minutes.

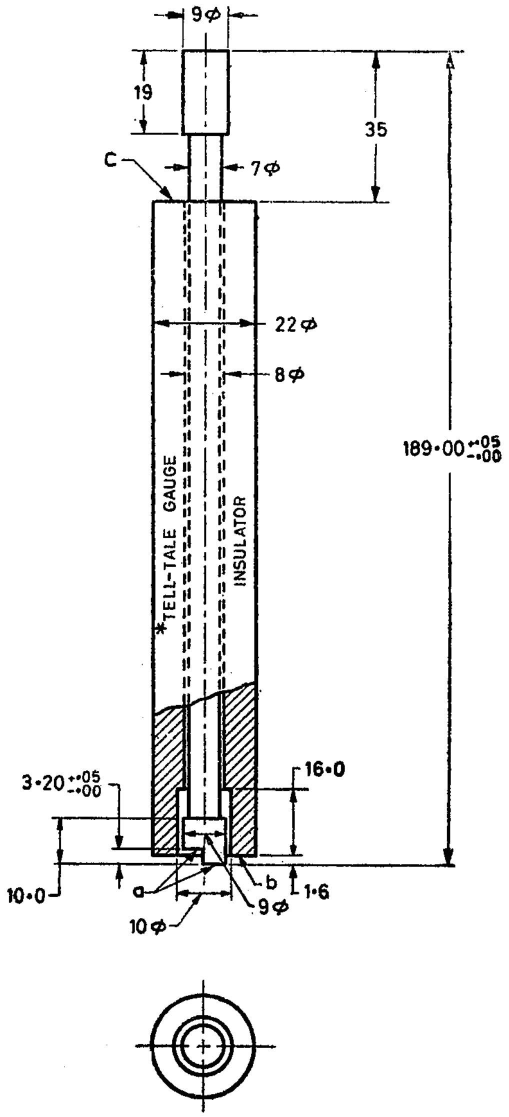


	B
Large, double-shed	58·74
Small, double-shed	41·28
Pot-head, double-shed	50·00

*To be engraved on body as indicated.

All dimensions in millimetres.

Fig. 5 'GO' Gauge

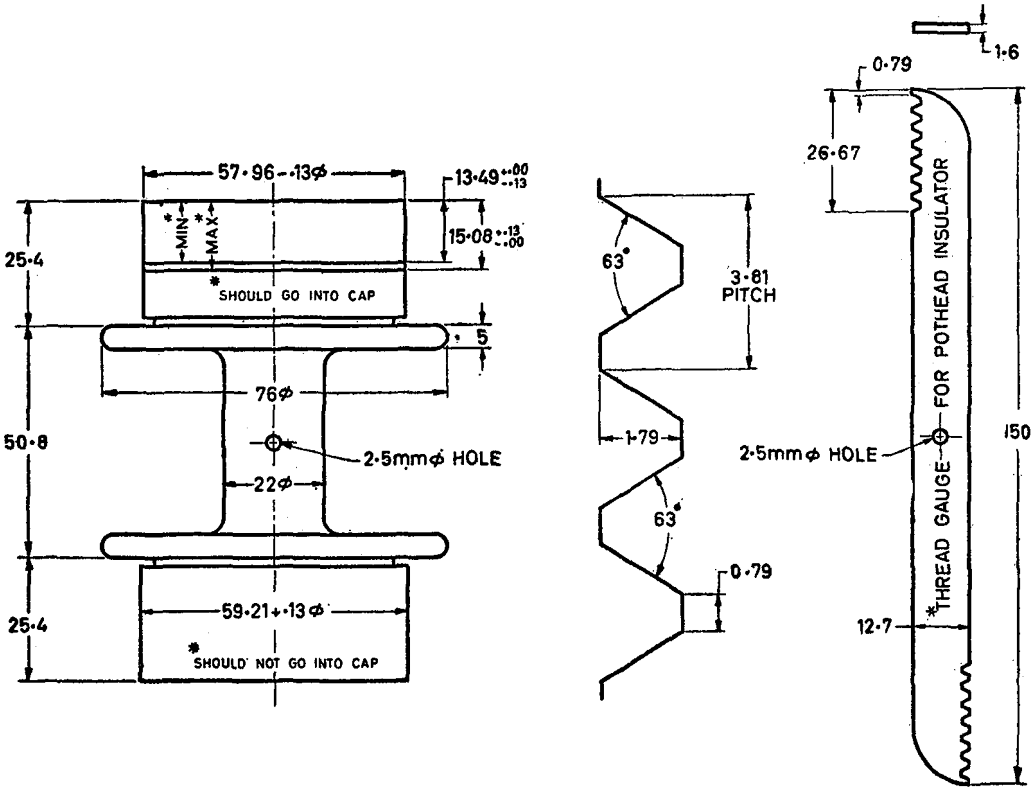


*To be engraved on body as indicated.

NOTE — The depth of the screwed cavity of the insulator shall be such that when the end '*C*' of the gauge body rests on the shoulder of the inner cup with the sliding rod resting on the bottom of the screwed cavity, end '*b*' of the gauge body shall be between the stepped surface marked '*a*'.

All dimensions in millimetres.

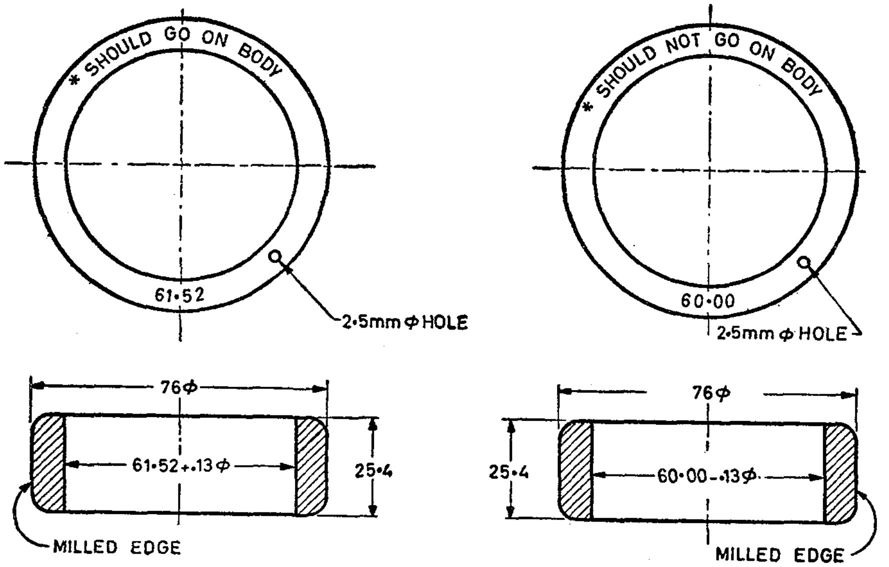
FIG. 6 TELL-TALE GAUGE



*To be engraved on body as indicated.

All dimensions in millimetres.

FIG. 7 GAUGES FOR POT-HEAD INSULATOR CAP



*To be engraved on body as indicated.
All dimensions in millimetres.

FIG. 8 GAUGES FOR POT-HEAD INSULATOR BODY TOP

7.3.2 The complete test shall comprise five transfers, namely, cold to hot, hot to cold, cold to hot, hot to cold, and cold to hot. The time taken to transfer the insulators from one bath to the other shall be as short as possible and shall not exceed 30 seconds. The quantity of water in the test tanks shall be large enough not to cause a temperature variation of more than 5°C in the water, when the insulators are immersed.

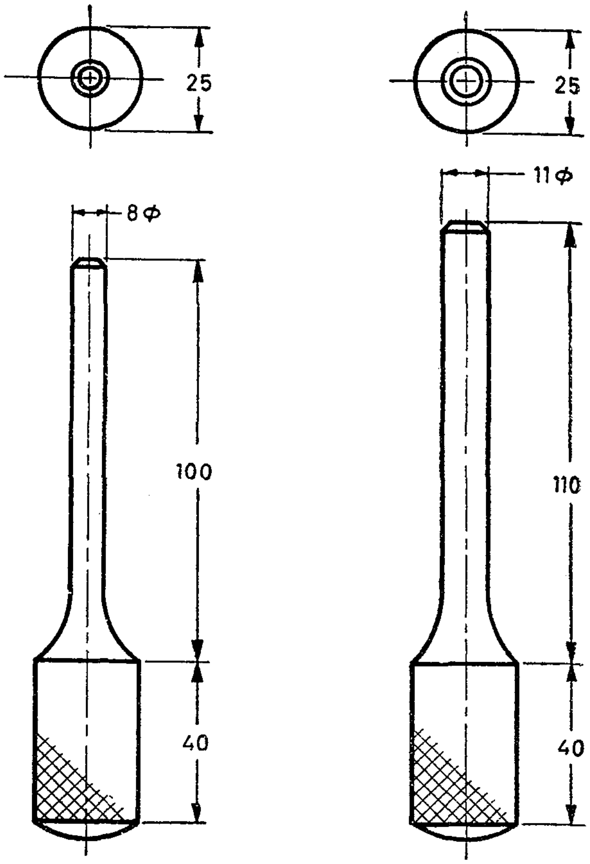
7.3.3 After the completion of the immersion, the insulator shall be examined to verify that it is not cracked and the glaze is undamaged.

7.4 Insulation Resistance Test

7.4.1 The insulators shall be kept immersed, as described below, inside an air-conditioned chamber maintained at a constant humidity of 80 ± 2 percent and a temperature of 27 ± 1°C for at least half an hour:

a) *Large and small double-shed insulators*

  1) *Method of setting up for test* — Level of water in the tank and in the space between sheds shall be 25 mm from the edge of the outer shed. Level of water in the screw-thread cavity shall be 25 mm below the edge of the inner shed.



' GO ' Gauge for LS Wire Hole of Pot-Head Insulator

' NOT GO ' Gauge for LS Wire Hole of Pot-Head Insulator

All dimensions in millimetres.

FIG. 9 'GO' AND 'NOT GO' GAUGES

2) *Test Condition* — Insulation to be measured:

i) between water in the inter-shed cavity and the screw-thread cavity, and

ii) between water in the inter-shed cavity and the tank.

TABLE 2 GAUGES FOR INSULATORS

(*Clause* 7.2.1.1)

GAUGE (1)	WHERE USED (2)	FIG. NO. (3)
'GO' screw	For all types	5
'TELL-TALE'	do	6
'GO' plug	For cap of pot-head insulator double-shed	7
'NOT GO' plug	do	
'THREAD'	do	
'GO' ring	For top of body of pot-head insulator double-shed	8
'NOT GO' ring	do	
'GO' tool	For checking the diameter of LS wire-leading in-hole	9
'NOT GO' tool	do	

b) *Pot-head, double-shed insulators*:

1) *Method of setting up for test* — Covers shall be removed before immersion. Level of water in the tank and in the space between sheds shall be 25 mm from the edge of the outer shed. Level of water in the screw-thread cavity shall be 25 mm below the edge of the inner shed.

2) *Test condition* — Insulation to be measured between water in the inter-shed cavity and the screw-thread cavity.

Under the same humidity and temperature conditions, the insulators shall be subjected to an insulation resistance test at a dc potential of not less than 250 V and not more than 500 V, measured by a sensitive reflecting galvanometer of D'Arsonval type with a minimum sensitivity of 600 mm per microampere at one metre.

The insulation resistance obtained shall be at least 50 000 megohms.

7.4.2 *Routine Insulation Resistance Test* — In the case of routine insulation resistance test, the insulators shall be completely immersed in the inverted position in water for not less than 12 hours. They shall then be kept immersed in the inverted position in water to the depths mentioned in **7.4.1** for a period of 4 hours before the insulation resistance tests are conducted.

7.4.2.1 The insulation resistance shall be measured between point mentioned in **7.4.1** with a 500-volt, 100 megohm range insulation tester, and shall not be below the infinity mark, the relative humidity being not more than 80 percent.

7.5 Mechanical Test — The insulators shall be mounted on a test pin with a head identical to the one which is used in actual service. The pin shall be fixed upright to a metal bracket on the testing machine. A flexible wire rope, about 6 mm in diameter, shall be looped round the tie-wire groove and shall be pulled at right angles to the axis of the insulator. The pull shall be increased gradually and evenly to the value shown in Table 3 and maintained for one minute. There shall be no fracture of the insulator.

TABLE 3 TEST LOAD ON INSULATORS

TYPE (1)	TEST LOAD TO BE APPLIED (2) kN
Large, double-shed	9
Small, double-shed	4·5
Pot-head, double-shed	9

7.6 Porosity Test

7.6.1 Porcelain fragments from the insulators shall be immersed in one percent alcoholic solution of fuchsin (1 g fuchsin in 100 g of methylated spirit) under a pressure of not less than 15 MN/m^2 for a period such that the product of the test duration in hours and the test pressure in MN/m^2 is not less than 180.

7.6.2 The fragments shall then be removed from the solution, washed, dried and broken. Examination with naked eye of the freshly broken surface shall not reveal any dye penetration. Penetration into small cracks formed during the initial breaking shall be neglected.

7.7 Visual Examination

7.7.1 A visual examination of the insulator shall be made. The insulator shall be free from physical distortion of shape and the vitrified glaze shall be hard and smooth, free from cracks or any other defect likely to be prejudicial to satisfactory performance in service.

7.7.2 With the exception of screw threads and those areas [as shown on the drawings (*see* Fig. 2 to 4)] which serve as supports during firing, the area of unglazed or defectively glazed parts shall not exceed 0·25 cm^2 per insulator.

7.7.3 The colour of the insulators shall approximate the colour specified (*see* **3.3**). Some variation in the colour shade is permitted and shall not justify rejection of the insulators.

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